

# PATENT SPECIFICATION

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## (54) ATOMIC ABSORPTION APPARATUS

- (71) We, SHANDON SOUTHERN INSTRUMENTS LIMITED, of Frimley Road, Camberley, Surrey, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—
- This invention relates to apparatus for performing spectroscopic experiments using atomic absorption techniques.
- When using a conventional pre-mixed flame (e.g. air/acetylene) difficulties are encountered when attempting to investigate certain elements such as Arsenic or Selenium due to the high absorption of radiation at the resonance line wavelengths (less than 200 nm) necessary to determine these elements.
- It is an object of the present invention to provide an improved apparatus by means of which the above disadvantages may be reduced and the sensitivity of the technique improved for a range of elements (e.g. As, Sb, Bi, Se, Te, Ge, Sn, Pb) that can be generated as volatile hydrides.
- The present invention consists in apparatus for performing spectroscopic experiments using atomic absorption techniques, which apparatus includes an absorption tube through which radiation may be directed and having an inlet pipe for introducing into the tube at a point along its length a sample in gas form, the tube being mounted upon the grid of a gas burner for heating the tube.
- In the accompanying drawings:—
- Figure 1 is a general view of one form of apparatus according to the present invention, and
- Figure 2 shows an alternative form of apparatus.
- In carrying the invention into effect according to one convenient mode by way of example, Figure 1 shows apparatus

which includes an absorption tube 1 mounted at each end by means of clips 2 upon the grid 3 of a gas burner (the rest of the burner being of conventional form is not shown).

The gas burner is arranged to heat the tube 1 to a temperature of between 700°C and 1800°C.

The tube 1 is provided with an inlet pipe 4 extending at right angles to the centre of the tube by means of which a sample in gas form may be introduced into the tube for absorption experiments using radiation directed axially through the tube.

The pipe 4 is provided with a coaxial outer tube 5, sealed to the pipe 4 adjacent the tube 1 but open at its other end to shield the pipe 4 from the heat from the burner and thus prevent or reduce dissociation of the gas sample before it enters the tube 1 by injecting cooling air into tube 5.

In some cases it has been found that hydrogen generated in the absorption tube may ignite at one or both ends of the tube on the optical axis of the tube thereby causing non-specific molecular absorption.

In order to overcome this difficulty, Figure 2 shows apparatus in which the tube is provided at each end with opposed inlets and outlets 6 and 7 respectively, by means of which a stream of an inert gas, such as argon or nitrogen may be directed across the tube to carry away hydrogen from the interior of the tube and prevent combustion of it at the ends of the tube. Combustion of the hydrogen at the outlets 7 will not interfere with experiments being made along the optical axis of the tube 1. Both inlets 6 may be fed from a common supply via connector 8.

The flow of the inert gas may be of the order of 2-4 litres/minute, for example equal to twice the axial flow rate. Preferably, as shown, the outlets 7 are larger

than the inlets 6.

WHAT WE CLAIM IS:—

1. Apparatus for performing spectroscopic experiments using atomic absorption techniques, which apparatus includes an absorption tube through which radiation may be directed and having an inlet pipe for introducing into the tube at a point along its length a sample in gas form, the tube being mounted upon the grid of a gas burner for heating the tube.
2. Apparatus as claimed in claim 1, wherein the inlet pipe extends at right angles to the centre of the tube.
3. Apparatus as claimed in claim 1 or 2, wherein the inlet pipe is provided with a co-axial outer tube sealed to the pipe at its end adjacent the tube but open at its other end.
4. Apparatus as claimed in claim 1, 2 or 3, wherein means are provided for injecting a stream of inert gas across the ends or end portions of the tube to prevent

combustion of hydrogen at the ends of the tube.

5. Apparatus as claimed in claim 4, wherein the said injecting means includes opposed inlets and outlets at each end of the tube to permit the flow of said stream of inert gas.

6. Apparatus as claimed in claim 5, wherein the outlets are larger than the inlets.

7. Apparatus for performing spectroscopic experiments, substantially as described with reference to Figure 1 of the accompanying drawings.

8. Apparatus for performing spectroscopic experiments, substantially as described with reference to Figure 2 of the accompanying drawings.

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